GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** S.Lehman
SITE DESCRIPTION NORTH ANNA COL		**GROUND WATER (ft)**
BORING NO. B-921	**DRILL METHOD:** Mud Rotary	**SAMPLE METHODS:** SPT	**0 HR.** ND
COLLAR ELEV. 308.0 ft (NAVD88)	**NORTHING** 3,909,680 US ft (NAD83)	**EASTING** 11,686,163 US ft (NAD83)	**24 HR.** ND
TOTAL DEPTH 73.9 ft	**DRILL MACHINE** CME 55LC Track	**DRILLER:** D. White	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 9/8/06	**COMPLETED** 9/8/06	**CORE BARREL TYPE:** NA	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	SOIL AND ROCK DESCRIPTION	DEPTH
308.0						Ground Surface	0.0
306.5	1.5					Silty, fine to coarse SAND (SM), olive brown (2.5Y 4/3) to light olive brown (2.5Y 5/3), dry to moist, medium dense to loose, clayey (Fill)	
304.5	3.5	6	6	5	921-1		
302.0	6.0	4	3	2	921-2		
299.5	8.5	2	4	5	921-3	Sandy CLAY (CL), olive (5Y 4/2), moist, medium stiff, contains organic debris (Residual Soil)	5.0
297.0	11.0	2	3	4	921-4	Silty SAND (SM), olive yellow (5Y 6/6), light olive brown (2.5Y 5/4) to olive brown (2.5Y 4/4), moist to wet, loose to medium dense, micaceous, relict rock fabric (Residual Soil)	8.5
294.5	13.5	3	4	5	921-5		
289.2	18.8	2	3	4	921-6		
284.2	23.8	3	3	4	921-7		
279.2	28.8	3	4	6	921-8		
274.2	33.8	9	9	10	921-9		
269.2	38.8	7	9	11	921-10	Silty, fine SAND (SM), very dark grayish brown (2.5Y 3/2), moist, dense to very dense, strong rock fabric (Residual Soil)	37.0
264.2	43.8	8	12	23	921-11		
259.2	48.8	22	24	35	921-12	Weathered Rock: Very dark grayish brown (2.5Y 3/2), dry, very dense, severely weathered, soft, BIOTITE GNEISS	48.0
254.2	53.8	50/0.1			921-13		
249.2	58.8	50/0.3			921-14		
244.2	63.8	41	50/0.4		921-15	Silty, fine SAND (SM), black (2.5Y 2.5/1) to strong brown (7.5YR 5/6), moist, very dense, strong rock fabric (Residual Soil)	61.5
239.2	68.8	25	35	35	921-16	Weathered Rock: Strong brown (7.5YR 5/6) with black and white, moist, very dense, severely weathered, BIOTITE GNEISS	66.5
234.2	73.8	28	50/0.4		921-17	Hard Rock: Black to very dark gray, mod. severely weathered, hard, BIOTITE GNEISS	71.8
		50/0.1			921-18		73.9

BLOWS PER FOOT: 0, 20, 40, 60, 80, 100

Boring terminated at 73.9 ft in Hard Rock: Moderately hard, QUARTZ-BIOTITE GNEISS

NORTH ANNA COL CORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST J. LAchewitz/M. Lear
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)
BORING NO. B-921A	DRILL METHOD: Mud Rotary	SAMPLE METHODS: UD/PITCHER BARREL
COLLAR ELEV. 307.4 ft (NAVD88)	NORTHING 3,909,687 US ft (NAD83)	EASTING 11,686,162 US ft (NAD83)
TOTAL DEPTH 40.4 ft	DRILL MACHINE CME 550 ATV	DRILLER: F. Cox
DATE STARTED 10/26/06	COMPLETED 10/27/06	CORE BARREL TYPE: NA

GROUND WATER (ft)	
0 HR.	ND
24 HR.	ND

HAMMER TYPE NA

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
307.4					Ground Surface				307.4 0.0
									No samples due to utility clearance operations-soft dig/ vac. truck excavation
									299.4 8.0
297.4	10.0					921A-UD-1			Silty, fine to coarse SAND (SM), dark gray, dark green, and white, moist, relict rock fabric
									921A-UD-1: Push from 10.0-12.0 ft; push pressure=900-1300 psi; recovery=0.9 ft
292.9	14.5					921A-UD-2			921A-UD-2: Push from 14.5-16.3 ft; push pressure=1200-1500 psi; recovery=1.7 ft
287.9	19.5					921A-UD-3			921A-UD-3: Push from 19.5-21.5 ft; push pressure=1200-1300 psi; recovery=1.8 ft
									921A-UD-4: Push from 24.5-26.3 ft; push pressure=1200-1500 psi; recovery=1.8 ft
282.9	24.5					921A-UD-4			921A-UD-5: Push from 29.5-20.7 ft; push pressure=1300-1700 psi/weight of rig; recovery=0.9 ft; end of tube damaged-sample not retained for testing
277.9	29.5					921A-UD-5			-Attempted shelby tube at 34.5 (refused)
									921A-PB-1: Advanced from 35.0-35.5 ft (Refused); recovery=0.5 ft
272.4	35.0					921A-PB-1			921A-PB-2: Advanced from 40.0-40.4 ft (Refused); recovery=0.4 ft-sample not retained/not enough sample for testing
267.4	40.0					921A-PB-2			267.0 40.4
									Boring terminated at 40.4 ft in Weathered Rock: QUARTZ-BIOTITE GNEISS

NORTH ANNA COL BORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** J. Howard/S. Lehman
SITE DESCRIPTION NORTH ANNA COL		**GROUND WATER (ft)**
BORING NO. B-922	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE
COLLAR ELEV. 271.3 ft (NAVD88)	**NORTHING** 3,909,944 US ft (NAD83)	**EASTING** 11,686,233 US ft (NAD83)
TOTAL DEPTH 26.5 ft	**DRILL MACHINE** CME 55LC Track	**DRILLER:** D. White
DATE STARTED 9/29/06	**COMPLETED** 10/2/06	**CORE BARREL TYPE:** HQ 3 triple tube-wireline

GROUND WATER (ft)	
0 HR.	ND
24 HR.	ND

HAMMER TYPE 140 lbs Auto

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
271.3					Ground Surface				271.3	0.0
269.8	1.5								Silty SAND (SM), pink (7.5YR 7/4) and reddish yellow (7.5YR 6/8), dry, medium dense to very dense, relict rock fabric (Residual Soil)	
267.5	3.8	3	2	15	47	922-1				
265.5	5.8	23	26	28	54	922-2			265.0	6.3
262.5	8.8	25	50/0.3			922-3			Weathered Rock: Orange gray, severely weathered, BIOTITE-QUARTZ GNEISS	
260.1	11.2	50/0.3				922-4				
		50/0.1				922-5			257.3	14.0
									Hard Rock: Tan gray, moderately to very slightly weathered, close to moderately close fracturing, medium hard to hard, BIOTITE-QUARTZ GNEISS	
									244.8	26.5
									Boring and coring terminated at 26.5 ft in Hard Rock: Hard, BIOTITE-QUARTZ GNEISS Boring abandoned at 26.5 ft due to rig in contact with underground electrical utlity energizing rig.	

NORTH ANNA COL BORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

GEOTECHNICAL CORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST J. Howard/S. Lehman	
SITE DESCRIPTION NORTH ANNA COL			GROUND WATER (ft)
BORING NO. B-922	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. ND
COLLAR ELEV. 271.3 ft (NAVD88)	NORTHING 3,909,944 US ft (NAD83)	EASTING 11,686,233 US ft (NAD83)	24 HR. ND
TOTAL DEPTH 26.5 ft	DRILL MACHINE CME 55LC Track	DRILLER: D. White	HAMMER TYPE 140 lbs Auto
DATE STARTED 9/29/06	COMPLETED 10/2/06	CORE BARREL TYPE: HQ 3 triple tube-wireline	
CORE SIZE HQ3	TOTAL RUN 15.2 ft		

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 11.3 ft
260.0	11.3	5.2	1:15 2:00 1:30 1:15 1:45/1.2	(2.5) 48%	(1.5) 29%	1				Weathered Rock: Orange gray, severely weathered, BIOTITE-QUARTZ GNEISS *(continued)* 257.3 14.0
254.8	16.5									Hard Rock: Tan gray, moderately to very slightly weathered, close to moderately close fracturing, medium hard to hard, BIOTITE-QUARTZ GNEISS
		5.0	2:00 2:00 2:15 1:45 3:00	(5.0) 100%	(4.0) 80%	2				(1 joint at 60°, 2 joints at 20°, 1 joint at 5°)
249.8	21.5									
		2.0	2:30 2:45	(4.7) 235%	(3.9) 195%	3				(6 joints at 10°, 4 joints at 70°)
247.8	23.5									247.8 23.5
										Coring terminated at 26.5 ft in Hard Rock: Hard, BIOTITE-QUARTZ GNEISS
										Boring abandoned at 26.5 ft due to rig in contact with underground electrical utlity energizing rig.

Run
Depth
Recovery
RQD
1
2
3
North Anna COL
6468-06-1472
B22
Box 1
Depth 11.3-26.5

B-922 – Box 1

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST B. Deobald
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)
BORING NO. B-922A	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE
COLLAR ELEV. 271.3 ft (NAVD88)	NORTHING 3,909,949 US ft (NAD83)	EASTING 11,686,244 US ft (NAD83)
TOTAL DEPTH 76.5 ft	DRILL MACHINE CME 55LC Track	DRILLER: D. White
DATE STARTED 10/31/06	COMPLETED 11/1/06	CORE BARREL TYPE: HQ 3 triple tube-wireline

GROUND WATER (ft)	
0 HR.	ND
24 HR.	3.0

HAMMER TYPE 140 lbs Auto

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
271.3					Ground Surface				271.3 — 0.0
									No samples due to utility clearance operations -soft dig/vac. truck excavation
267.7	3.6								267.7 — 3.6
		30	50/0.5			922A-1			Weathered Rock: QUARTZ-BIOTITE GNEISS
264.9	6.4								
		50/0.3				922A-2			263.1 — 8.2
									Hard Rock: Orange, pink, and light gray, moderately severely to slightly weathered, very close to moderately close fracturing, moderately hard to very hard, QUARTZ-BIOTITE GNEISS
									219.3 — 52.0
									Weathered Rock: Severely weathered, QUARTZ-BIOTITE GNEISS with lense of Hard Rock: Light gray, moderately weathered, very close fracturing, hard, QUARTZ-BIOTITE GNEISS from 56.0-56.5 ft
									213.5 — 57.8
									Hard Rock: Pink and gray, very slightly weathered to fresh, close to wide fracturing, very hard, QUARTZ-BIOTITE GNEISS

NORTH ANNA COL BORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST B. Deobald	
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)	
BORING NO. B-922A	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. ND
COLLAR ELEV. 271.3 ft (NAVD88)	NORTHING 3,909,949 US ft (NAD83)	EASTING 11,686,244 US ft (NAD83)	24 HR. 3.0
TOTAL DEPTH 76.5 ft	DRILL MACHINE CME 55LC Track	DRILLER: D. White	HAMMER TYPE 140 lbs Auto
DATE STARTED 10/31/06	COMPLETED 11/1/06	CORE BARREL TYPE: HQ 3 triple tube-wireline	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
196.5					Continued from previous page				
									194.8 — 76.5 Boring and coring terminated at 76.5 ft in Hard Rock: Very hard, QUARTZ-BIOTITE GNEISS

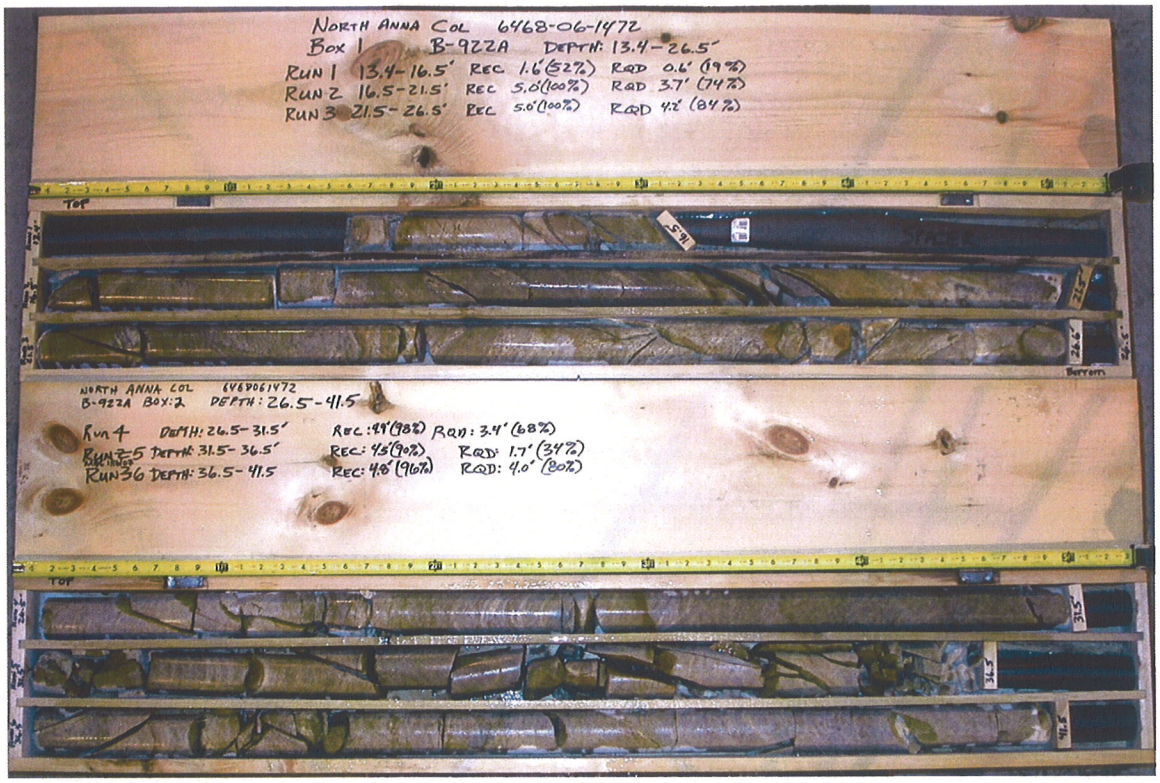
GEOTECHNICAL CORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST B. Deobald
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)
BORING NO. B-922A	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE
COLLAR ELEV. 271.3 ft (NAVD88)	NORTHING 3,909,949 US ft (NAD83)	EASTING 11,686,244 US ft (NAD83)
TOTAL DEPTH 76.5 ft	DRILL MACHINE CME 55LC Track	DRILLER: D. White
DATE STARTED 10/31/06	COMPLETED 11/1/06	CORE BARREL TYPE: HQ 3 triple tube-wireline
CORE SIZE HQ3	TOTAL RUN 63.1 ft	

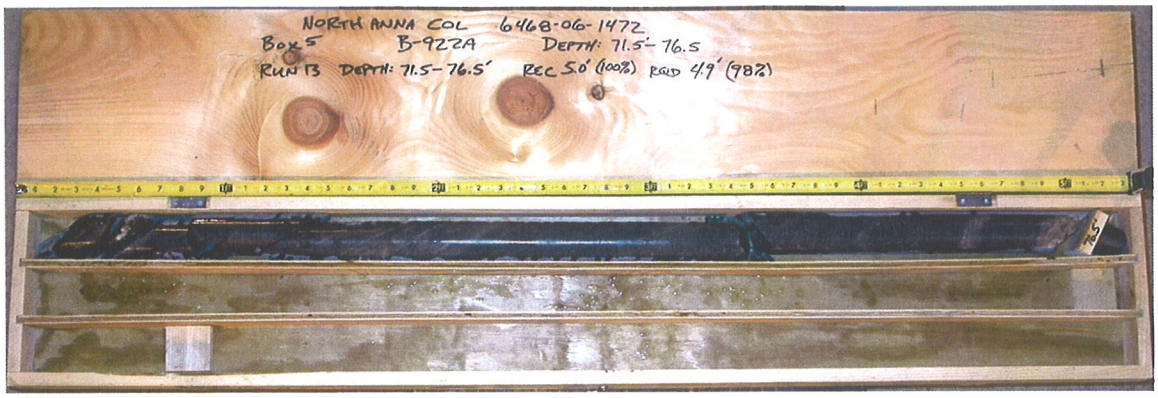
0 HR.	ND	HAMMER TYPE 140 lbs Auto
24 HR.	3.0	

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 13.4 ft
257.9	13.4	3.1	1:40 1:50 2:00/1.1	(1.6) 52%	(0.6) 19%	1				Hard Rock: Orange, pink, and light gray, moderately severely to slightly weathered, very close to moderately close fracturing, moderately hard to very hard, QUARTZ-BIOTITE GNEISS *(continued)*
254.8	16.5	5.0	2:30 2:15 2:20 1:55 1:40	(5.0) 100%	(3.7) 74%	2				(3 joints at 10°, 2 joints at 30° with clay and Fe stain) (3 joints at 10°, 4 joints at 50° with Fe stain)
249.8	21.5	5.0	2:00 2:25 2:00 2:10 2:15	(5.0) 100%	(4.2) 84%	3				(3 joints at 10°, 6 joints at 50° with Fe stain)
244.8	26.5	5.0	2:14 2:10 2:20 2:05 2:10	(4.9) 98%	(3.4) 68%	4				(7 joints at 10°, 3 joints at 45°, 2 joints at 60°-all with Fe stain)
239.8	31.5	5.0	2:40 2:45 4:40 2:50 2:05	(4.5) 90%	(1.7) 34%	5				(7 joints at 50°, 4 joints at 45°, 2 joints at 80°-all with Fe stain; other joints not discernible)
234.8	36.5	5.0	3:20 3:30 3:50 3:30 3:15	(4.8) 96%	(4.0) 80%	6				(7 joints at 0°, 1 joint at 45°, 3 joints at 70°-all with Fe stain)
229.8	41.5	5.0	2:40 2:46 3:05 2:59 2:40	(4.7) 94%	(4.0) 80%	7				(2 joints at 0°, 2 joints at 30°, 2 joints 45°-all with Fe stain)
224.8	46.5	5.0	3:01 3:24 3:24 3:30 6:30	(4.7) 94%	(3.1) 62%	8				(2 joints at 0°, 4 joints at 50°, 2 joints at 75°-all with Fe stain; other joints not discernible)
219.8	51.5	5.0	3:59 2:55 2:49 2:51 2:17	(2.2) 44%	(0.0) 0%	9				219.3 — 52.0 Weathered Rock: Severely weathered, QUARTZ-BIOTITE GNEISS with lense of Hard Rock: Light gray, moderately weathered, very close fracturing, hard, QUARTZ-BIOTITE GNEISS from 56.0-56.5 ft
214.8	56.5	5.0	3:31 3:06 5:09 3:30 4:30	(3.3) 66%	(2.3) 46%	10				213.5 — 57.8 (3 joints at 45°, others not discernible) Hard Rock: Pink and gray, very slightly weathered to fresh, close to wide fracturing, very hard, QUARTZ-BIOTITE GNEISS
209.8	61.5	5.0	3:23 3:47 3:40 3:52 3:35	(5.0) 100%	(5.0) 100%	11				(2 joints at 25°, 1 joint at 60°)
204.8	66.5	5.0	4:11 5:05 4:31 4:17 4:12	(4.9) 98%	(4.8) 96%	12				(2 joints at 20°, 2 joints at 45°, 1 joint at 60°)
199.8	71.5	5.0	2:45 3:01 2:12 2:11 2:06	(5.0) 100%	(4.9) 98%	13				(2 joints at 50°)
194.8	76.5									194.8 — 76.5 Coring terminated at 76.5 ft in Hard Rock: Very hard, QUARTZ-BIOTITE GNEISS



B-922A – Box 1
B-922A – Box 2

B-922A – Box 3
B-922A – Box 4


NORTH ANNA COL 6468-06-1472
BOX 5 B-922A DEPTH: 71.5-76.5
RUN 13 DEPTH: 71.5-76.5' REC 5.0' (100%) RQD 4.9' (98%)
76.5

B-922A – Box 5